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(54) Layered Electrolytic Capacitor and Manufacturing Method for Same

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(72) Inventor: Ichiro Tanaka

c/o Elna Co., Ltd.

2-2-1 Tsujido Shinmachi, Fujisawa-shi

(71) Applicant: Elna Co., Ltd.

### 2-2-1 Tsujido Shinmachi, Fujisawa-shi

## Specification

## 1. Title of the Invention

# Layered Electrolytic Capacitor and manufacturing Method for Same

## 2. Claims

(1) A layered electrolytic capacitor, comprising: an internal case for holding an anode foil with an outgoing lead on one side and a cathode foil, which are layered on top of each other with a separator in between; an exterior case for containing this; and an upper lid for this.

(2) A manufacturing method for a layered electrolytic capacitor, wherein an anode foil and a cathode foil are layered on top of each other with a separator in between within an internal case, outgoing leads are made in such a manner as to lead out from the case and lead lines are connected to the respective outgoing leads, the contents of the case are impregnated with an electrolyte, the lead lines are connected to terminals on an upper lid, and the internal case is contained within an exterior case which is then sealed with the upper lid.

### 3. Detailed Description of the Invention

The present invention relates to a structure for a layered electrolytic capacitor and a manufacturing method for the same, and in particular, to the simplification of the form of foils and separators which are punched out, the simplification of the work of assembly through layering, and elimination of localized pressure by using a uniform element support in order to prevent bursting.

Layered electrolytic capacitors are characterized in that they have excellent high frequency properties and the form can be freely selected so that the capacitors can be easily flattened in comparison with so-called rolled electrolytic capacitors where anode and cathode foils are rolled up in cylindrical form so as to face each other with a separator in between. In the manufacture of such layered electrolytic capacitors according to the prior art, as shown in Fig 4, an anode foil and a cathode foil are layered on top of each other with a separator in between and contained within a casing, and it is necessary to press the surfaces of the layered body against each other with a jig (11), and outgoing leads (12) which protrude outward from the layered element are integrated through caulking or the like and connected to leading terminals. When the above described jig (11) is removed so that the element can be contained within the casing, the thickness is slightly recovered, so that great stress is caused in the base portions of outgoing leads (12) due to the caulking, and thus, physical distortion remains. Therefore, this layered electrolytic capacitor has a defect, such that an outgoing leads may be disconnected due to localized pressure or bursting may occur.

The present invention is to prevent the above described defect in the prior art and simplify the form of foils and separators which are punched out, as well as to implement precise and speedy work of layering. The present invention is described in the following in reference to one embodiment, shown in Figs 1 to 3. (1) indicates an internal case, and this internal case (1) is formed of an insulating material, such as a synthetic resin, where supporting lines (2) are formed in the four corners of the sides of the case so as to work as guides for the layered element. In addition, notches from which outgoing leads (9) lead out and a number of notches (3) which make passage of electrolyte easy are created in these sides. In addition, a lid (4) which works as a plate for pressing the layered element is provided for the opening in the upper portion. In this case (1), anode foils (5) and cathode foils (7) which have been punched out in advance through a pressing process are layered with separators (6) in between, and thus, a layered element (8) is formed. In this case, separators (6) have the same dimensions as the inside of internal case (1), as shown in Fig 3, while anode foils (5) and cathode foils (7) are formed so as to be slightly smaller than the internal dimensions of the internal case (1) as a whole, and outgoing leads (9) are formed on one side of the

anode foils and the cathode foils, and protrusions (10) are formed so as to make contact with the inner sides of support lines (2) in a direction diagonal to internal case (1) and work as guides for positioning. These anode foils (5) and cathode foils (7) may have the same form, and are layered on top of each other so as to be directed in different directions, and thus, the form of the foils and separators which are punched out can be simplified.

In the configuration described above, as shown in Fig 1, an anode foil (5), a separator (6), a cathode foil (7), a separator (6) are repeatedly layered in sequence so that a layered element having a desired thickness is formed in an internal case (1), and a lid (4) is placed on top of this and a certain pressure is applied, and lid (4) is welded shut through high frequency welding or the like. Here, in this case, an auxiliary pressing plate (20) made of a separate elastic material, such as silicon rubber, may be inserted, in order to gain a certain pressing force against layered element (8). Next, as shown in Fig 2, outgoing leads (9) of anode foils (5) are collectively connected to a lead line (21) and cathode foils (7) are collectively connected to another lead line (21) through laser, electron beam or tungsten inert gas welding, and after impregnation with an electrolyte, the end portions of the lead lines are connected to the inner ends of external terminals (24) on an upper lid (23) through caulking or the like. The whole is contained in an exterior case (22) which is larger than internal case (1), and the above described upper lid (23) is welded to exterior case (22) so as to seal it through high frequency welding or the like, and thus, the process is completed.

As described above, in addition to an exterior case (22), there is an internal case (1), which is installed inside the exterior case, so that this internal case (1) serves as a guide box at the time of assembly of a layered element (8) and as a pressing jig for the simplification of the work of layering. In addition, this case (1) is mounted within exterior case (22) as it is, and thus, the work of assembly can be simplified, and furthermore, a uniform pressing force can be applied to the surface of layered element (8), and thereby, disconnection of outgoing leads and bursting due to localized pressure can be prevented.

#### 4. Brief Description of the Drawings

Fig 1 is an exploded perspective diagram showing the main parts of a layered electrolytic capacitor according to one embodiment of the present invention;

Fig 2 is an exploded side diagram showing the main parts of the same layered electrolytic capacitor;

Fig 3 is an exploded plan diagram showing the main parts of the same layered element; and

Fig 4 is a diagram illustrating a conventional layered capacitor at the time of assembly.

In the above diagrams:

- (1) internal case
- (2) support lines
- (3) notches
- (4) lid
- (5) anode foils
- (6) separators
- (7) cathode foils
- (8) layered element
- (9) outgoing leads
- (21) lead lines
- (22) exterior case
- (23) upper lid
- (24) external terminals

Patent Applicant: Elna Co., Ltd.

## ⑫ 公開特許公報 (A)

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審査請求 未請求

(全 3 頁)

## ⑭ 積層形電解コンデンサおよびその製造方法

藤沢市辻堂新町2丁目2番1号

エルナー株式会社内

⑮ 特 願 昭57—231826

⑯ 出 願 人 エルナー株式会社

⑰ 出 願 昭57(1982)12月28日

藤沢市辻堂新町2丁目2番1号

⑱ 発 明 者 田中一郎

## 明 細 書

## 1. 発明の名称

積層形電解コンデンサおよびその製造方法

## 2. 特許請求の範囲

(1) 一方の側に引出しリードを具えた陽極箔と陰極箔をセパレータを介して重層保持する内部ケースと、これに収納する外装ケースとその上蓋を設けてなる積層形電解コンデンサ。

(2) 陽極箔と陰極箔をセパレータを介して内部ケース内に積層し、同ケースから引出しリードを導出して夫々引出線を接続し、電解液中に含浸処理し、同引出線を上蓋の端子に接続し、同内部ケースを外装ケースに収納し、上蓋をもって封口してなる積層形電解コンデンサの製造方法。

## 3. 発明の詳細な説明

本発明は積層形電解コンデンサの構造ならびにその製造方法に関するもので、とくに箔・セパレータの抜き形状の簡素化と積層組立作業の簡易化

および均一な素子抑えにより局部的圧迫をなくしパンクを防止するものである。

積層形電解コンデンサは陽極箔をセパレータを介して対向させ円筒状に巻取るいわゆる巻取形電解コンデンサに比べ高周波特性に優れ形状が自由に選択でき偏平化しやすい等の長を有するが、この積層形電解コンデンサは従来製造上において第4図に示す如く、陽極箔と陰極箔をセパレータを介して積層し、ケーシングに収納するにあたり、積層面を治具(11)によって押圧する必要があり、積層素子の外方に突出する引出しリード(12)をカシメ等で一体化して引出端子に接続する一方、ケーシングに収納するため上記治具(11)を取外すと素子の厚みが若干復元し、カシメによる引出しリード(12)の根本部に大きなストレスとして機械的な歪が残り、局部的な圧迫による引出しリードの断線、或いはパンク等が発生する欠点を有していた。

本発明は上記従来型の欠点を除去するとともに、箔・セパレータの抜き形状の簡素化とともに正

確かつ迅速な積層作業の実現を提供するものである。以下第1図乃至第3図に示す一実施例について本発明を説明すると、(1)は内部ケースで、同内部ケース(1)は合成樹脂等の絶縁素材で形成され、その側縁の四隅部には積層素子のガイドを兼ねた保持線(2)が形成され、また同側縁には引出しリード(9)の導出部となる切欠き、および電解液の流通を良くする複数の切欠き(3)が形成される。また上部開口上には積層素子の押え板を兼ねた蓋体(4)を設ける。かかるケース(1)内には予めプレス加工により打抜加工された陽極箔(5)と陰極箔(7)をセパレータ(6)を介して積層し、積層素子(8)を形成する。この場合、セパレータ(6)は第3図の如く内部ケース(1)の内側と同一寸法とし、また陽極箔(5)と陰極箔(7)は全体として内部ケース(1)の内寸法より若干小さく形成し、その一侧には引出しリード(9)を形成するとともに内部ケース(1)の斜め方向の保持線(2)の内側に当接させて位置合せとガイドを役目とする突出部(

10)を形成する。かかる陽極箔(5)と陰極箔(7)は積層にあたり互い違いに向きを変えて重設すればよく同一の形状とすることができ、箔およびセパレータの抜き形状を簡素化できる。

上記の様な構成により、第1図の如く内部ケース(1)内に陽極箔(5)、セパレータ(6)、陰極箔(7)、セパレータ(6)のくり返しにより順次積重ねて所要厚みの積層素子が形成され、その上に蓋体(4)を載せ所定の圧力を加えて高周波溶接等により蓋体(4)を溶接する。なおこの場合、積層素子(8)にたいして所要の押圧力を得るため、シリコンラバー等の別個の弾性素材による補助押圧板(20)を挿設してもよい。つぎに第2図の如く陽極箔(5)、陰極箔(7)の夫々の引出しリード(9)をまとめてレーザー、電子ビーム、或いはタングステンイナートガス溶接等により引出線(21)を接続し、電解液による含浸を経てその端部を上蓋(23)の外部端子(24)の内端にカシメ等にて接続し、内部ケース(1)より大きい外装ケース(22)内にこれ

を収納し、上記上蓋(23)を高周波溶接等により外装ケース(22)に溶接封口して完成する。

以上説明した様に外装ケース(22)のほかにその内側に内部ケース(1)を設置してなり、同内部ケース(1)は積層素子(8)の組立時のガイドボックスとしての役目をもたせるとともに押圧治具として兼用でき積層作業の簡易化をはかることができる。また同ケース(1)は外装ケース(22)内にそのまま装設されるので組立作業を簡略でき、さらに積層素子(8)の積層面に均一な押圧力を与えることができ、局所的な圧迫による引出リードの断線或いはパンク等をなくすことができる。

#### 4. 図面の簡単な説明

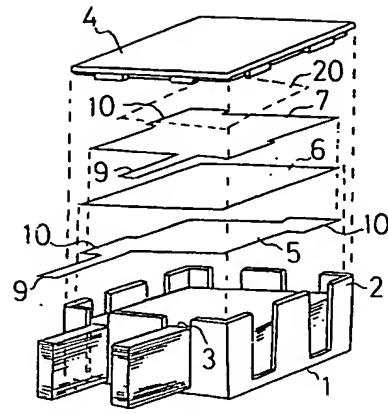
第1図は本発明の一実施例を示す積層形電解コンデンサの要部分解斜視図、第2図は同じく積層形電解コンデンサの要部分解側面図、第3図は同じく積層素子の要部分解平面図、第4図は従来型の積層コンデンサの組立時の説明図である。

同図中

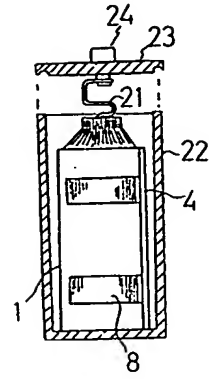
- |                |               |
|----------------|---------------|
| (1) ... 内部ケース  | (2) ... 保持線   |
| (3) ... 切欠き    | (4) ... 蓋体    |
| (5) ... 陽極箔    | (6) ... セパレータ |
| (7) ... 陰極箔    | (8) ... 積層素子  |
| (9) ... 引出しリード | (21) ... 引出線  |
| (22) ... 外装ケース | (23) ... 上蓋   |
| (24) ... 外部端子  |               |

特許出願人 エルナー株式会社

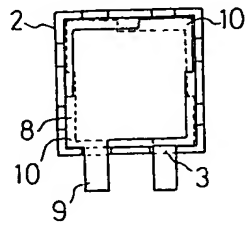
第1図



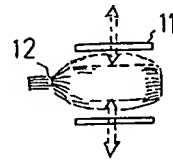
第2図



第3図



第4図



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